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COMPLETE SPECIFICATION.

Communicated by ALBERT CHARLES CLARK, Manufacturer, at the corner of Michigan Avenue and Randolph Street, of Chicago, County of Cook, State of Illinois, U.S.A.

“ Improvements in Inhalers ”

I, WALLACE FAIRWEATHER, C.E. of 65 & 66 Chancery Lane, London, W.C. Chartered Patent Agent, do hereby declare the nature of this invention as communicated to me and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:

5 My invention relates to inhalers for administering anaesthetics and the like, such as nitrous oxide gas used in dental operations, although the inhaler is capable of administering any anaesthetic, as well as gases generally, even oxygen. The object of my invention is to provide a simple and efficient device of this character, whose features of advantage and utility will be apparent from
10 the description hereinafter given.

In the drawings, Fig. 1 is a perspective of my inhaler shown applied to a patient; Fig. 2 a sectional view thereof; Fig. 3 a bottom plan view of the inhaler with the inhaler tubes shown in section; Fig. 4 a sectional elevation on line 4—4 of Fig. 3; Fig. 5 an elevation of my muffling device; Fig. 6 an
15 enlarged sectional view of the muffling receptacle; and Fig. 7 a plan view thereof, partly in section.

My inhaler comprises essentially a casing arranged to be attached preferably to the forehead of the patient in suitable manner and provided with two depending inhaling tubes which are, by preference, flexible and adapted to be inserted
20 in the nasal passages. The casing 1, above mentioned, may be made of any desired shape and dimensions and of suitable material, sheet metal, hard rubber or the like, and in the present instance the same is somewhat crescent shaped so as to fit the curvature of the patient's forehead. To attach the casing to the head, an elastic band 2 is secured at the ends or tips of such casing, but
25 to adjust the length of the band, the same may be made in two pieces held adjustably by a buckle or the like, as usual in head bands for other purposes.

The casing is connected in suitable manner to a source of supply of gas or other anaesthetic or the like, as by means of the flexible tube or pipe 3.

Two separate inhaling tubes depend from the casing and communicate there-
30 with, and of course with the gas supply, whereby the gas is conducted direct to the nasal passage of the patient. In the present instance such inhaling tube comprises a flexible rubber pipe 5, connected at one end with the casing, and having at its other end a stiff pipe or tube 6 with its free end extended upwardly. The inner end of each rubber pipe 5 slips upon a screw-threaded sleeve 7, which
35 in turn fits or screws upon a nozzle 8 projecting from and communicating with the casing 1, there being two of such nozzles, one for each inhaling tube. Each tube is provided with a coiled spring 9 fitted inside the rubber pipe and

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preferably attached to the sleeve whereby the inhaling tubes may be readily adjusted to the nasal passage. The free end of each inhaling tube is provided with a tip 10 of rubber or the like, preferably removable, and of a size and shape to fit the nasal passage and in order to close all passage around the tip when inserted in the nose and thereby prevent inhalation of air at such point, 5 the tips may be provided with a suitable circumferential flange 11 of the same material as the tip or not, as desired, and either separate or integral therewith. Moreover, the flange may be flexible like soft rubber if desired.

At any suitable point in the casing an exhaling port or opening 12 is provided, the same being controlled by a suitable check valve, which, in the 10 present instance, is an ordinary disk 13 freely movable in a cage 14 secured over said port 12. At the time of inhalation, this check valve closes the port 12, but in exhalation the same opens the port.

The gas inlet into the casing from the gas supply is provided with a check valve 15 working in a cage 16 and arranged to open during inhalation but to 15 close during exhalation.

This inhaler is particularly adapted to dental purposes and the construction and arrangement is such that the same can be readily applied and left in position without inconvenience to the patient or interference with the operator, during the dental operation, whether the extracting or filling of teeth, with 20 the result that in the event that additional gas is required to complete the operation, the same may be administered by simply opening the gas supply valve. In case it is desired to permit the patient to inhale pure air after the gas has been shut off, or to inhale the gas diluted with air, the casing may be provided with a suitable valve-governed opening, and in the present instance 25 I have shown for this purpose a disk 17 pivoted at 19 to the bottom of the casing, that is, the nozzle side thereof, and adapted to control an opening 18 communicating between the interior of the casing and the atmosphere. The patient may thus be given pure air, or diluted gas, without removing the inhaling tubes. The provision of the casing held to the patient's forehead and 30 the depending flexible tubes affords considerable advantage over the hood type of inhalers, in that the device supplies the gas direct to the nasal passage and is more compact and easier to manipulate. Furthermore my inhaler does not interfere with the operator's work, and is more agreeable to the patient. Moreover leakage of gas around the inhaler, which is objectionable with the hood 35 type, is impossible with my construction of inhaler. Furthermore, my inhaler is more cleanly in view of the fact that the tips can be easily removed and sterilized at each use of the apparatus. A bag 20 may, if desired, be used intermediate the gas supply and inhaler, as shown in Fig. 1 of the drawings.

Inhalers of the character described are generally supplied with gas, usually 40 nitrous oxide, held under great compression in strong metallic cylinders from which the gas is drawn off into the gas bag or directly into the inhaler tube when no bag is used. As the gas thus escapes from the cylinder, a hissing noise is produced which is disagreeable especially to the patient. To avoid this objection I have provided a muffling device which also serves to cleanse 45 the gas and also temper it thereby bringing it to the same temperature as the room where used.

By preference, my muffling and cleansing device is incorporated into the usual gas stand and the same will therefore be described in such association 50 although the specific location is immaterial so far as mere operation is concerned.

The gas stand A has a post a arranged to support the gas cylinders B B and also the muffling device which comprises essentially the two heads C C¹ between which is arranged a closed cylinder or receptacle c preferably of glass. As shown in Fig. 6, the lower head C¹ has a hub c^1 which fits into the upper end of the tubular post a where it is secured in place by screws as shown, or other- 55 wise. The lower head is provided with a drain cock c^2 and also with a flange c^3 to engage the shell c and form a pocket for the packing ring c^4 .

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A rod c^5 screws into the lower head and extends axially through the cylinder c and through a central opening in the upper head, such rod, which has a nut c^6 on its upper end affording means as shown, for clamping the parts together. The upper head is constructed similarly to the lower head as to flange and
 5 packing ring.

A tube or sleeve D^2 screws into the central opening of the upper head and depends therefrom to within a short distance of the bottom of the shell. This tube surrounds the rod c^5 , and is of greater diameter than the latter.

Secured diametrically across the upper head are tubular cross arms D D^1
 10 co-operating with stop cocks E E interposed between them and connections d d^1 which communicate with the gas cylinders B B respectively. The casing of the stop cocks is extended to form a chamber for absorbent cotton e or the like for filtering the gas on its passage from the cylinder or cylinders to the muffling device proper. The upper head is provided with a nozzle c^7 to which a flexible
 15 supply pipe leading to the inhaler may be connected. The shell or muffling receptacle may be partly filled with pure water or any liquid containing chemicals acting not only to wash the same but to purify the same. However, such receptacle may be filled with absorbent cotton or the like but the liquid is preferred.

In practice, the gas valve of one of the cylinders or tanks B B^1 having been
 20 opened, the corresponding stop cock E is opened, thereby permitting the gas to flow through the absorbent material e where it is preliminarily strained and into the depending tube D^2 where the gas is permitted to expand somewhat. The gas then flows downward to the lower end of the tube and bubbles up
 25 through the liquid from the bottom of the receptacle, filling the space in the upper part thereof. The gas having thus been expanded without that disagreeable hissing sound and having been strained, washed and purified, is now ready for use, and for this purpose the gas is taken off to the inhaler through a suitable supply pipe as already explained. Moreover, the device attains
 30 another advantage in that the liquid which has a temperature approximating that of the room serves to raise the temperature of the gas (reduced by expansion) as it is passed therethrough.

Furthermore, in case the receptacle is made transparent, as a glass shell, the feature of sight feed is provided inasmuch as, by observation of the re-
 35 ceptacle, the operator can tell whether the flow of gas is uniform and sufficient and also whether any leaks exist.

The muffling device need not constitute a part of the structure of the gas stand as herein illustrated, inasmuch, as such device may be connected at any point in a pipe leading from the gas cylinder, but such arrangement of parts
 40 is highly desirable in the way of economy in manufacture and ease of manipulation by the operator.

Having now particularly described and ascertained the nature of my said invention, and in what manner the same is to be performed, I declare that what I claim is:—

45 1. An inhaler comprising a casing communicating with a source of supply of anaesthetic or the like supported from above and an inhaling tube depending therefrom and arranged to supply the anaesthetic or the like directly to the patient's nasal passage; substantially as described.

2. An inhaler comprising a casing communicating with a source of supply
 50 of anaesthetic or the like arranged to be secured to the patient's forehead and a pair of depending inhaling tubes leading from the casing and arranged to be inserted in the nasal passage for direct delivery thereto of the anaesthetic or the like; substantially as described.

3. An inhaler comprising a casing communicating with a source of supply
 55 of anaesthetic or the like and arranged to be attached to the patient's forehead, and a pair of inhaling tubes leading from the casing and made flexible for

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adjustment and insertion into the patient's nasal passage; substantially as described.

4. An inhaler comprising a casing communicating with a source of supply of anaesthetic or the like, and a pair of inhaling tubes communicating with the casing and having removable tips at their free ends for insertion in the nasal passage of the patient; substantially as described. 5

5. In connection with the subject matter of Claim 4, the provision of flanges on the tips to prevent escape of the anaesthetic or entrance of air around the tips; substantially as described.

6. In connection with the subject matter of Claims 2 and 3, a manually operated valve for admitting air into the casing for supplying air to the patient without removing the tubes from the nasal passage; substantially as described. 10

7. An inhaler comprising a casing which communicates with a source of anaesthetic or the like and which is curved on one side to fit upon the patient's forehead, a head band for holding the casing in position, and a pair of flexible inhaling tubes depending from the casing and having upwardly turned free ends arranged to be inserted in the patient's nasal passage; substantially as described. 15

8. An inhaler comprising a casing communicating with a source of supply of anaesthetic or the like and having a valve-governed gas inlet and a valve-governed exhalation outlet, and a pair of flexible inhaling tubes depending from and communicating with the casing and whose free ends are adapted to be inserted in the patient's nasal passage for supplying the gas or inhalent direct to his nasal passage; substantially as described. 20

Dated this 15th day of December, 1903.

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CRUIKSHANK & FAIRWEATHER

Chartered Patent Agents,

65 & 66 Chancery Lane, London, and

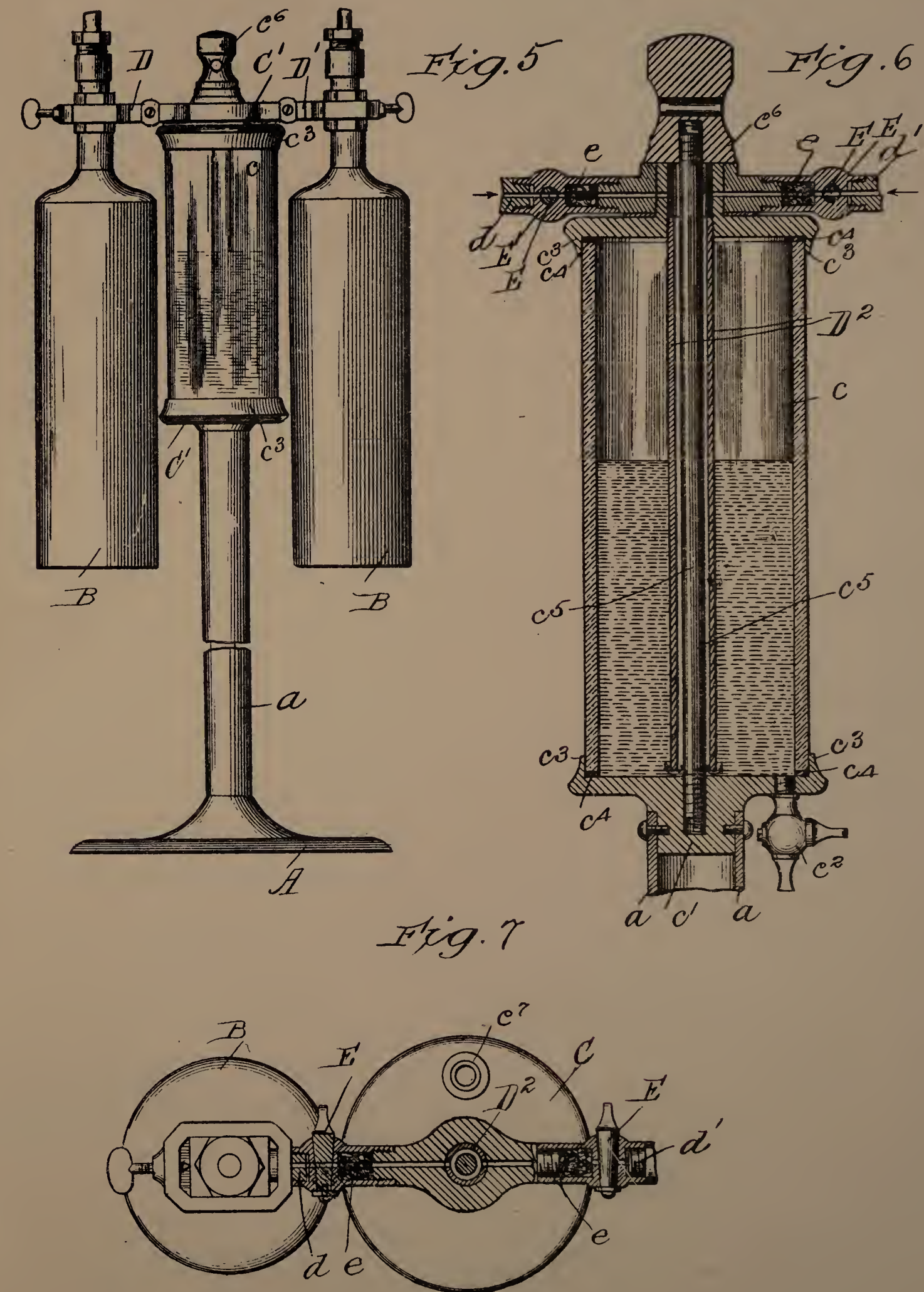
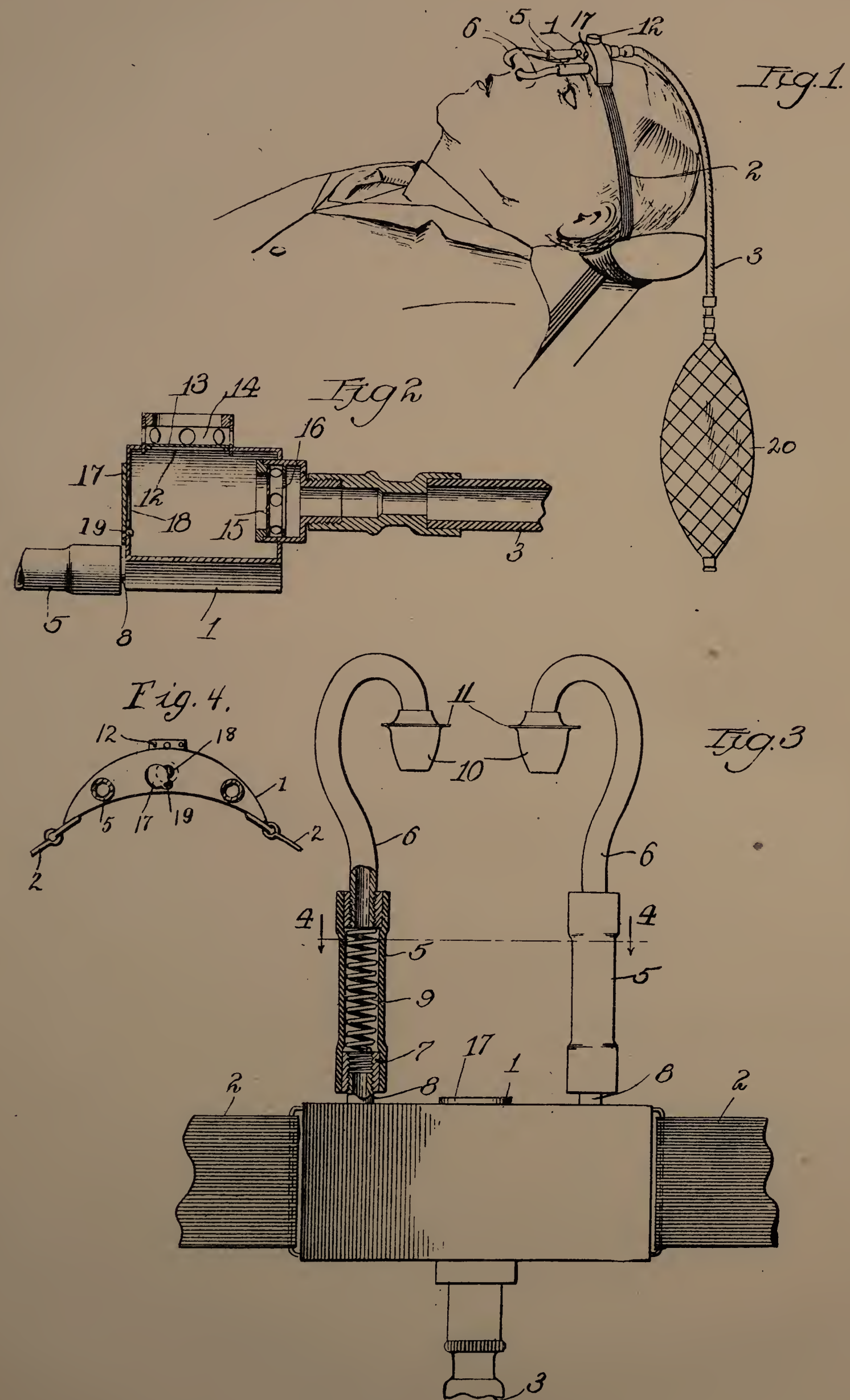
62 Saint Vincent Street, Glasgow.

Agents for the Applicant.

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Redhill: Printed for His Majesty's Stationery Office, by Love & Malcomson, Ltd.—1904.





[This Drawing is a reproduction of the Original on a reduced scale.]

